

**University of Toronto**  
**Department of Statistical Sciences**  
**ACT240H1F - Mathematics of Investment & Credit**  
**Summer 2024**

**Course Information**

Instructor	Hassan Abdelrahman
Email	hassan.abdelrahman@mail.utoronto.ca
Lectures	Mondays & Wednesdays 19:00 – 21:00; Room MS 2173
Office Hours	Thursdays 16:00 – 17:00; Zoom

T.A.	Sebastian Calcetero
Email	sebastian.calcetero@mail.utoronto.ca
Tutorials	Mondays & Wednesdays 18:00 – 19:00; Room MS 2173

**Course Description**

Welcome to ACT240, your first actuarial science core course. In this course we will study the Theory of Interest, including discount and present values, determination of prices of annuities, mortgages, bonds and equities, loan amortization, yield rates on investments, etc. In addition to learning standard textbook materials, we will also apply them in real-life scenarios, such as payday loans, stock pricing, residential mortgage and pension, etc.

Note: This course is for students working to enter actuarial science major or specialist program. For other students interested in similar course material, please enroll in ACT230 Mathematics of Finance for Non-Actuaries. In addition, to enroll in any 300- or 400-level ACT course, a minimum grade of 63% must be obtained in each of ACT240, ACT245 and ACT247.

**Teaching Style**

My teaching strategy for this course involves closely following the coursebook. During lectures, I will provide slide shows that include only the key points of each topic. However, I will annotate on these slides during the lecture to provide additional context and elaboration. I will upload these slides before the lectures so that you can bring them to class and add your own annotations if you wish (I recommend you do so). After each lecture, I will also upload my annotated version of the slides. It's important to note that succeeding in this course requires you to read the coursebook, complete the problem sets, and attend tutorials in addition to the lectures. The lectures are intended to help you understand the course material, but you must do independent work as well.

## Required Text

- Broverman coursebook for ACT240+ACT245

Details on when and how you can purchase your textbook will be posted on Quercus.

## Course Outline

This course outline is just tentative. Some sections might go faster than others.

Date	Schedule	Topic	Exam
May 6	Lecture 1	Section 1 – Effective Rates of Interest & Discount	
May 8	Lecture 2	Section 2 – Nominal Rates of Interest & Discount	
May 13	Lecture 3	Section 3 – Force of Interest, Inflation, Risk of Default	
May 15	Lecture 4	Section 4 – Annuity-Immediate & Annuity-Due	
May 20	Victoria Day		
May 22	Lecture 5	Section 5 – Annuity Valuation at Any Time Point	Test 1
May 27	Lecture 6	Section 6 – Annuities With Differing Interest and Payment Periods	
May 29	Lecture 7	Section 7 – Annuities Whose Payments Follow a Geometric Progression	
June 3*	Lecture 8	Section 8 – Annuities Whose Payments Follow an Arithmetic Progression	
June 5	Lecture 9	Section 9 – Amortization of a Loan	Test 2
June 10	Lecture 10	Section 10 – Bond Valuation	
June 12	Lecture 11	Section 11 – Bond Amortization, Callable Bonds	
June 17	Lecture 12	Review Session	

\* Note that the last day to drop the course is June 3.

## Course Assessments

There will be six online quizzes (30 minutes each), two **in-tutorial** midterm tests (1 hour each) and one final exam (2 hours). The dates and the weights of the assessments are given below:

Assessment	Date of Evaluation	Weighting
Quizzes	Fridays	15%
Midterm 1	May 22	25%
Midterm 2	June 5	25%
Final	TBA	35%
Total		100%

By the end of each week, a quiz will be posted on Quercus no later than 9 am on Friday, and the quiz window will remain open until midnight. Each quiz will cover the content taught in the week. Once you start the quiz, you'll have 30 minutes to finish it. Your lowest grade will be dropped.

The structure and content of the exams will be announced at least one week in advance of each exam.

## Missed Quizzes or Tests

There are NO make-up quizzes, and so, no marks will be given to missed quizzes. If the midterm is missed for a valid reason, you must provide appropriate documentation, such as the University of

Toronto Medical Certificate, University of Toronto Health Services Form, or College Registrar's Letter. You must submit this documentation within one week of the test. If documentation is not received in time, your test mark will be zero. If midterm is missed for a valid reason, the weight of that midterm (or those midterms) will be shifted to the final. For example, if you take the first midterm and miss the second midterm for a valid reason, then your evaluation will be based on the formula  $15\% \times \text{quizzes} + 25\% \times \text{midterm 1} + 60\% \times \text{Final}$ .

**You are not allowed to miss the two midterm tests. Missing both tests would result in an automatic deduction of 25%.**

### **Accessibility Needs**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or Accessibility Services at 416-978 8060; [studentlife.utoronto.ca/as](http://studentlife.utoronto.ca/as).

### **Academic Integrity**

At the University of Toronto, academic integrity is a vital part of the learning and academic experience. All assessments and coursework must be completed solely by the individual student, without any outside help. Receiving any form of assistance on an assessment, whether from a fellow student in the course or someone not affiliated with the course, is a severe academic offense. Additionally, providing help to another student in the course on an assessment is equally serious. Posting or sharing questions from assessments is strictly prohibited at all times.

Please further familiarize yourself with the University of Toronto's Code of Behavior on Academic Matters available at <http://academicintegrity.utoronto.ca>, or you may also look at <https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity>.